themselves consumed, this external heating and final combustion adding slightly to the light emitted.

Any unsaturated hydrocarbons which have escaped conversion into acetylene before luminosity commences, and also any methane which may be present on passing into the higher temperatures of the luminous zone, become converted there into acetylene, and at once being decomposed to carbon and hydrogen, increase the area of the light-giving portion of the flame.

My thanks are due to Mr. F. B. Grundy for the help he has given me in the work entailed by this paper.

IV. "A possible Explanation of the two-fold Spectra of Oxygen and Nitrogen." By E. C. C. Baly, A.I.C., 1851 Exhibition Scholar in University College, London. Communicated by Professor Ramsay, F.R.S. Received February 27, 1895.

(Abstract.)

The two spectra of oxygen are shown to be of a different nature. They behave differently, and reasons are given for their being in all probability the spectra of different gases. They may either be two spectra produced by different vibrations of the oxygen molecule, or they may be the spectra of two different modifications of oxygen, or the spectra of two distinct gases resulting from a dissociation of oxygen, a combination of which is called oxygen.

It appeared worth while to undertake experiments with a view of testing the last of these. Oxygen was sparked in an apparatus similar to that used by Professor J. J. Thomson in his experiments on the electrolysis of steam. Hollow platinum electrodes were used, each one of which was connected with a Sprengel mercury pump. In the first experiments, the distance between the electrodes was 35 mm., and the highest pressure compatible with the appearance of the two spectra was made the starting point of the experiments. In these first experiments it was 380 mm. The density of the oxygen before sparking was determined, and taken as a test of its purity. The fractions obtained from the anode and cathode were weighed, and the results are given. They follow the lines of J. J. Thomson's results, inasmuch as with long sparks a lighter fraction was obtained at the cathode, and with short sparks a heavier fraction. The fractions from the anode were not so definite as from the cathode, though the difference was in the right direction. The probable maximum error of weighing was 0·0001 gram. This meant exactly one in the second decimal place of the density obtained. The general accuracy of the results may be gauged from the densities of unsparked oxygen obtained.

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Density of cathode fraction with long sparks.	Density of oxygen unsparked.	Density of cathode fraction with short sparks.
15·78	15·88	16·00
15·79	15·87	16·01
15·80	15·89	16·02
15·79	15·88	16·04
	15·88	16·06
		16·05

Mean of results of other observers = 15·887.

Density of cathode fraction from oxygen, previously for three days fractionated with short sparks, 15·75.

The experiments are still in progress.

V. "On the Question of Dielectric Hysteresis." By ALFRED W. PORTER, B.Sc., Demonstrator of Physics, University College, London, and DAVID K. MORRIS, 1851 Exhibition Scholar, University College, London. Communicated by Professor G. CAREY FOSTER, F.R.S. Received March 2, 1895.

The condenser on which the following experiments were made is the one referred to in a paper by one of us read before the Royal Society on June 1st, 1893 ('Roy. Soc. Proc.,' vol. 54, p. 7). It is a 5-microfarad condenser of tinfoil and paraffined paper, made by Messrs. Muirhead. In the paper referred to it was shown that when it is allowed to discharge itself through a coil containing induction the rate of dissipation of energy (calculated from the damping of the oscillations that occur) is greater than that due to the resistance of the outside circuit: the additional dissipation being equal to what would have taken place if about 59 ohms had been added to the circuit resistance.

The following experiments were made with the idea of ascertaining whether this additional dissipation is the result simply of viscosity in the dielectric of the condenser or to true hysteresis of the charge with respect to the potential difference between the condenser plates. A sharp distinction is not always made between the two phenomena; it cannot be too clearly borne in mind that, on the one hand, viscosity is a "time" effect—*i.e.*, it depends on the rate of change of the variables; while, on the other hand, the phenomenon of hysteresis does not in any way involve the rate at which the changes in the quantities are made.

Rapidly performed series of cycles, such as occur during an